

Micrologic control units

2.0 A, 5.0 A, 6.0 A and 7.0 A

Low Voltage Products

User manual



Merlin Gerin

Modicon

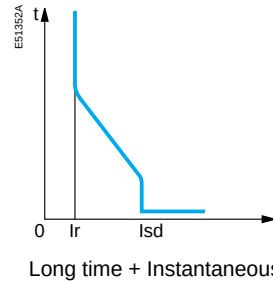
Square D

Telemecanique

Discovering your control unit	2
Identifying your control unit	2
Overview of functions	4
Setting your control unit	10
Selecting the type of neutral protection	10
Setting procedure	11
Setting the Micrologic 2.0 A control unit	12
Setting the Micrologic 5.0 A control unit	13
Setting the Micrologic 6.0 A control unit	14
Setting the Micrologic 7.0 A control unit	15
Fault and status indications	16
Resetting the fault indications and checking battery status	16
Testing the earth-fault and earth-leakage functions	17
Menus	18
Accessing the menus	18
Measuring phase currents	19
Displaying the maximum current values	20
Resetting the maximum current values	21
Viewing the settings	22
Technical appendix	24
Tripping curves	24
Changing the long-time rating plug	26
Zone selective interlocking (ZSI)	27
Digital display	28
Thermal memory	29

All Compact NS800-3200 and Masterpact NT and NW circuit breakers are equipped with a Micrologic control unit that can be changed on site. Control units are designed to protect power circuits and connected loads.

Micrologic 2.0 A: basic protection and ammeter



E51450A

Micrologic 2.0 A

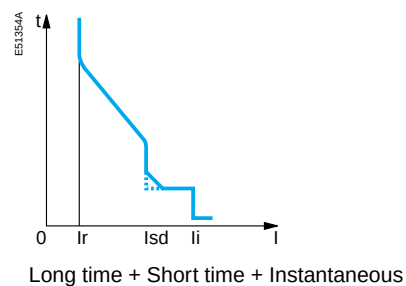
X
Y
Z

X: type of protection
c 2 for basic protection
c 5 for selective protection
c 6 for selective + earth-fault protection
c 7 for selective + earth-leakage protection

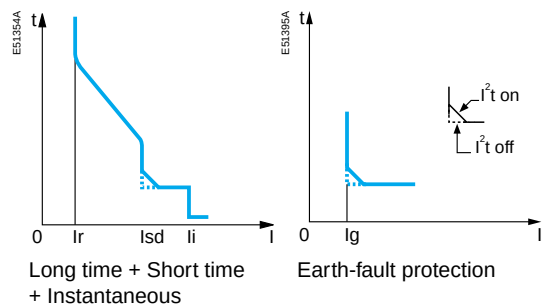
Y: version number
identification of the control-unit generation.
"0" signifies the first generation.

Z: type of measurement
c A for "ammeter"
c P for "power meter"
c H for "harmonic meter"
c no indication: no measurements

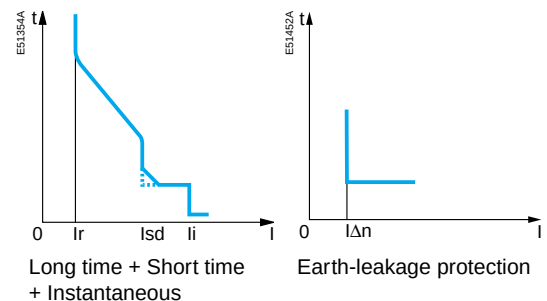
Micrologic 5.0 A: selective protection and ammeter



Micrologic 6.0 A: selective + earth-fault protection and ammeter



Micrologic 7.0 A: selective + earth-leakage protection and ammeter



Presentation

- 1 top fastener
- 2 bottom fastener
- 3 protective cover
- 4 cover opening point
- 5 lead-seal fixture for protective cover
- 6 long-time rating plug
- 7 screw for long-time rating plug
- 8 connection with circuit breaker
- 9 infrared link with communications interfaces
- 10 terminal block for external connections
- 11 housing for battery
- 12 digital display
- 13 three-phase bargraph and ammeter

Adjustment dials

- 14 long-time current setting I_r
- 15 long-time tripping delay t_r
- 16 short-time pickup I_{sd}
- 17 short-time tripping delay t_{sd}
- 18 instantaneous pick-up I_{sd}
- 19 instantaneous pick-up I_i
- 20 earth-fault pick-up I_g
- 21 earth-fault tripping delay t_g
- 22 earth-leakage pick-up $I_{\Delta n}$
- 23 earth-leakage tripping delay Δt

Indications

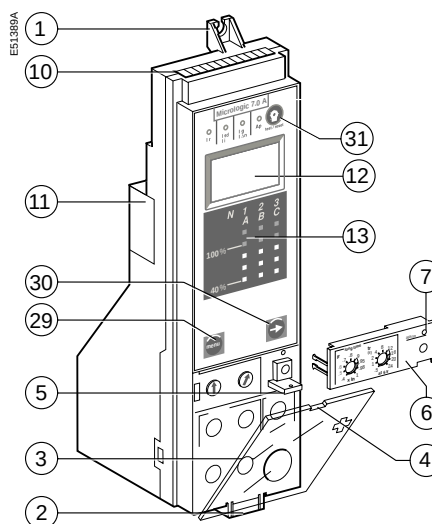
- 24 LED indicating long-time tripping
- 25 LED indicating short-time tripping
- 26 LED indicating earth-fault or earth-leakage tripping
- 27 LED indicating auto-protection tripping
- 28 LED indicating an overload

Navigation

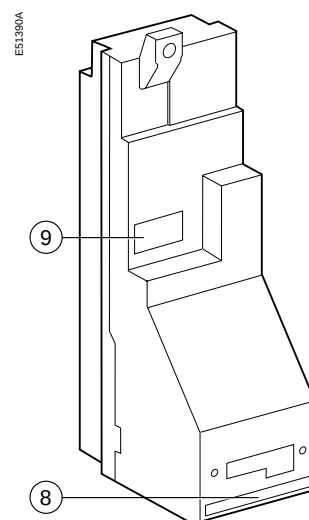
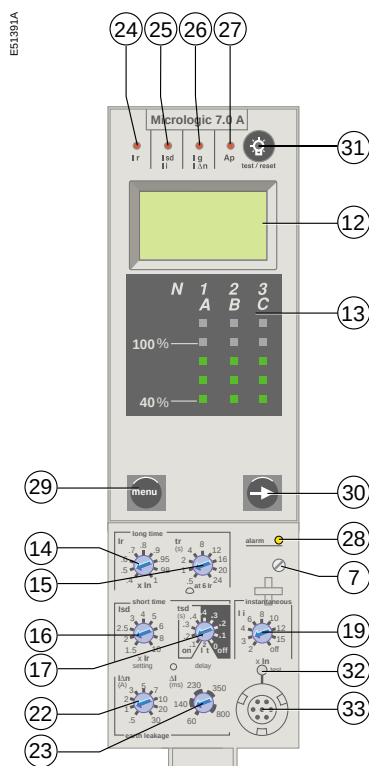
- 29 navigation button to change menus
- 30 navigation button to view menu contents
- 31 button for fault-trip reset and battery test

Test

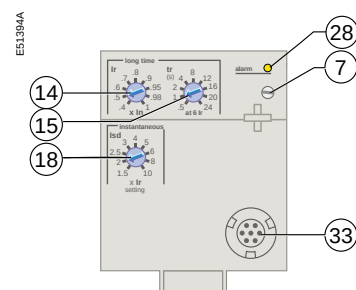
- 32 test button for earth-fault and earth-leakage protection
- 33 test connector



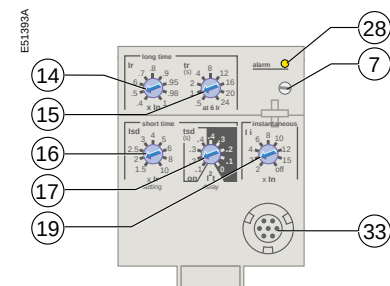
Micrologic 7.0 A



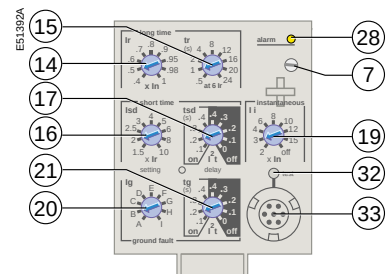
Micrologic 2.0 A



Micrologic 5.0 A



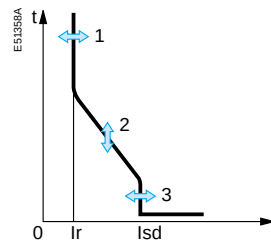
Micrologic 6.0 A



Protection settings

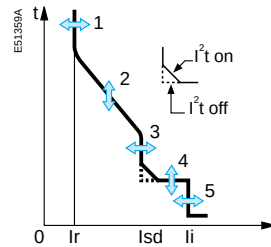
Depending on the type of installation, it is possible to set the tripping curve of your control unit using the parameters presented below.

Micrologic 2.0 A



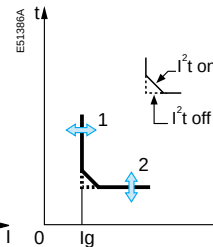
1. current setting I_r (long time)
2. tripping delay t_r (long time) for $6 \times I_r$
3. pick-up I_{sd} (instantaneous)

Micrologic 5.0 A, 6.0 A,
7.0 A



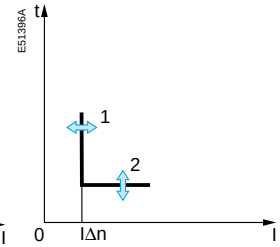
1. current setting I_r (long time)
2. tripping delay t_r (long time) for $6 \times I_r$
3. pick-up I_{sd} (short time)
4. tripping delay t_{sd} (short time)
5. pick-up I_i (instantaneous)

Micrologic 6.0 A



1. pick-up I_g (earth fault)
2. tripping delay t_g (earth fault)

Micrologic 7.0 A



1. pick-up $I_{\Delta n}$ (earth leakage)
2. tripping delay Δt (earth leakage)

Long-time protection

The long-time protection function protects cables (phases and neutral) against overloads. This function is based on true rms measurements.

Thermal memory

The thermal memory continuously accounts for the amount of heat in the cables, both before and after tripping, whatever the value of the current (presence of an overload or not). The thermal memory optimises the long-time protection function of the circuit breaker by taking into account the temperature rise in the cables. The thermal memory assumes a cable cooling time of approximately 15 minutes.

Long-time current setting I_r and standard tripping delay t_r

Micrologic control unit		2.0 A and 5.0 A									
current setting	$I_r = I_n \times \dots (*)$	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1	
tripping between		other ranges or disable by changing rating plug									
1.05 and $1.20 \times I_r$											
time delay (s)	t_r at $1.5 \times I_r$	12.5	25	50	100	200	300	400	500	600	
accuracy:	t_r at $6 \times I_r$	0.5	1	2	4	8	12	16	20	24	
0 to -20 %	t_r at $7.2 \times I_r$	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6	

* I_n : circuit breaker rating

Setting accuracy of the I_r setting may be enhanced by using a different long-time rating plug.

See the technical appendix "Changing the long-time rating plug".

For the characteristics and external wiring of the zone selective interlocking function, see the technical appendix on "Zone selective interlocking".

The portable test kit can be used to test the wiring between circuit breakers for the zone selective interlocking function.

Short-time protection

c the short-time protection function protects the distribution system against impedant short-circuits

c the short-time tripping delay can be used to ensure discrimination with a downstream circuit breaker

c this function carries out true rms measurements.

c the I²t ON and I²t OFF options enhance discrimination with downstream protection devices

c use of I²t curves with short-time protection:

v I²t OFF selected: the protection function implements a constant time curve;

v I²t ON selected: the protection function implements an I²t inverse-time curve up to 10 I_r. Above 10 I_r, the time curve is constant.

c zone selective interlocking (ZSI)

The short-time and earth-fault protection functions enable time discrimination by delaying the upstream devices to provide the downstream devices the time required to clear the fault. Zone selective interlocking can be used to obtain total discrimination between circuit breakers using external wiring.

Short-time pick-up I_{sd} and tripping delay tsd

Micrologic control unit		2.0 A, 5.0 A, 6.0 A and 7.0 A								
pick-up	I _{sd} = I _r x ...	1.5	2	2.5	3	4	5	6	8	10
accuracy ± 10 %										
time delay	settings I ² t OFF	0	0.1	0.2	0.3	0.4				
(ms) at 10 I _r	I ² t ON		0.1	0.2	0.3	0.4				
I ² t ON or	tsd (max resettable time)	20	80	140	230	350				
I ² t OFF	tsd (max break time)	80	140	200	320	500				

Instantaneous protection

c the instantaneous-protection function protects the distribution system against solid short-circuits. Contrary to the short-time protection function, the tripping delay for instantaneous protection is not adjustable.

The tripping order is sent to the circuit breaker as soon as current exceeds the set value, with a fixed time delay of 20 milliseconds.

c this function carries out true rms measurements.

Instantaneous pick-up I_{sd}

Micrologic control unit		2.0 A								
pick-up	I _{sd} = I _r x ...	1.5	2	2.5	3	4	5	6	8	10
accuracy ± 10 %										

Instantaneous pick-up I_i

Micrologic control unit		5.0 A, 6.0 A and 7.0 A								
pick-up	I _i = I _n x ... (*)	2	3	4	6	8	10	12	15	OFF
accuracy ± 10 %										

* I_n: circuit-breaker rating

Protection of the fourth pole on four-pole circuit breakers

Protection of the neutral conductor depends on the distribution system.
There are three possibilities.

Type of neutral	Description.
Neutral unprotected	The distribution system does not require protection of the neutral conductor.
Neutral protection at $0.5 I_n$	The cross-sectional area of the neutral conductor is half that of the phase conductors. c the long-time current setting I_r for the neutral is equal to half the setting value c the short-time pick-up I_{sd} for the neutral is equal to half the setting value c the instantaneous pick-up I_{sd} (Micrologic 2.0 A) for the neutral is equal to half the setting value c the instantaneous pick-up I_i (Micrologic 5.0 A / 6.0 A / 7.0 A) for the neutral is equal to the setting value.
Neutral protection at I_n	The cross-sectional area of the neutral conductor is equal to that of the phase conductors. c the long-time current setting I_r for the neutral is equal to the setting value c the short-time pick-up I_{sd} for the neutral is equal to the setting value c the instantaneous pick-ups I_{sd} and I_i for the neutral are equal to the setting value.

Earth-fault protection on Micrologic 6.0 A

c an earth fault in the protection conductors can provoke local temperature rise at the site of the fault or in the conductors.
The purpose of the earth-fault protection function is to eliminate this type of fault.
c there are two types of earth-fault protection.

Type	Description
Residual	c the function determines the zero-phase sequence current, i.e. the vectorial sum of the phase and neutral currents c it detects faults downstream of the circuit breaker.
Source Ground Return	c using a special external sensor, this function directly measures the fault current returning to the transformer via the earth cable c it detects faults both upstream and downstream of the circuit breaker c the maximum distance between the sensor and the circuit breaker is ten metres.

c earth-fault and neutral protection are independent and can therefore be combined.

Earth-fault pick-up I_g and tripping delay t_g

The pick-up and tripping-delay values can be set independently and are identical for both the residual and "source ground return" earth-fault protection functions.

Micrologic control unit		6.0 A									
pick-up	$I_g = I_n \times \dots (*)$	A	B	C	D	E	F	G	H	I	
accuracy	$I_n \leq 400 \text{ A}$	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	
$\pm 10 \%$	$400 \text{ A} < I_n \leq 1200 \text{ A}$	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	
	$I_n > 1200 \text{ A}$	500 A	640 A	720 A	800 A	880 A	960 A	1040 A	1120 A	1200 A	
time delay	settings I^2t OFF	0	0.1	0.2	0.3	0.4					
(ms) at $10 I_n (*)$	I^2t ON		0.1	0.2	0.3	0.4					
I^2t ON or	t_g (max resettable time)	20	80	140	230	350					
I^2t OFF	t_g (max break time)	80	140	200	320	500					

* I_n : circuit-breaker rating

Current protection and alarms

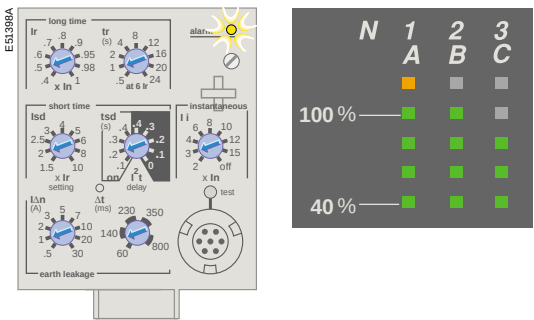
Earth-leakage protection on Micrologic 7.0 A

- c the earth-leakage protection function primarily protects people against indirect contact because an earth-leakage current can provoke an increase in the potential of the exposed conductive parts. The earth-leakage pick-up value $I_{\Delta n}$ is displayed directly in amperes and the tripping delay follows a constant-time curve
- c an external rectangular sensor is required for this function
- c this function is inoperative if the long-time rating plug is not installed
- c d protected against nuisance tripping.
- c k DC-component withstand class A up to 10 A.

Pick-up value $I_{\Delta n}$ and tripping delay Δt

Micrologic control unit		7.0 A								
pick-up	$I_{\Delta n}$	0.5	1	2	3	5	7	10	20	30
accuracy										
0 to - 20 %										
time delay	settings									
(ms)	Δt (max resettable time)	60	140	230	350	800				
	Δt (max break time)	140	200	320	500	1000				

Overload LED



This LED signals that the long-time current setting I_r has been overrun.

The auto-protection function (excessive temperature or short-circuit higher than circuit-breaker capacity) opens the circuit breaker and turns on the Ap LED.

Caution.

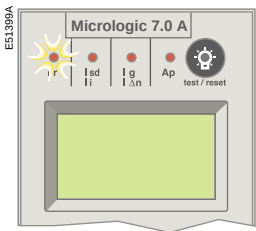
If the circuit breaker remains closed and the Ap LED remains on, contact the Schneider after-sales support department.

Caution.

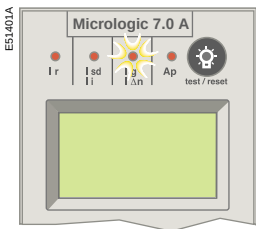
The battery maintains the fault indications. If there are no indications, check the battery.

Fault indications

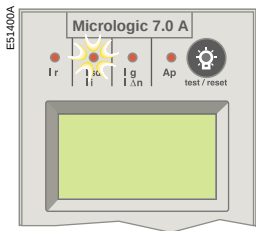
Signals tripping due to an overrun of the long-time current setting I_r .



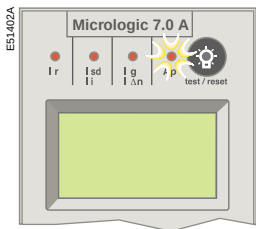
Signals tripping due to an overrun of the earth-fault pick-up I_g or the earth-leakage pick-up $I_{\Delta n}$.



Signals tripping due to an overrun of the short-time pick-up I_{sd} or the instantaneous pick-up I_i .

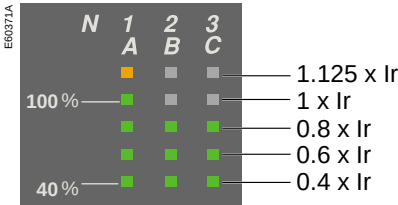


Signals tripping due to the auto-protection function of the control unit.



If no information is displayed on the screen, see the technical appendix "Digital display".

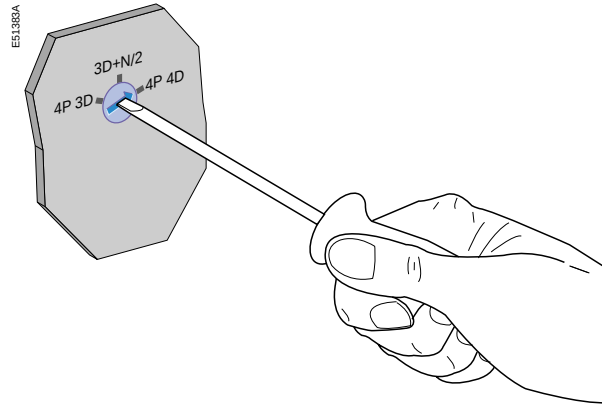
- c all Micrologic control units measure the true rms value of currents
- c the most heavily loaded phase is continuously displayed on the digital screen
- c using the navigation buttons, it is possible to display successively the I1, I2, I3, neutral IN, Ig, IΔN and stored-current (maximeter) values
- c the percent load on each phase is displayed. A bargraph displays the currents measured on phases 1, 2 and 3 as a percentage of the long-time current setting Ir.



Selecting the type of neutral protection

On four-pole circuit breakers, it is possible to select the type of neutral protection for the fourth pole:

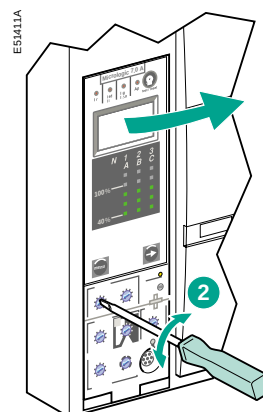
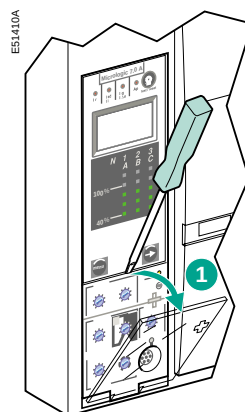
- c neutral unprotected (4P 3D);
- c neutral protection at $0.5 I_n$ ($3D + N/2$);
- c neutral protection at I_n (4P 4D).



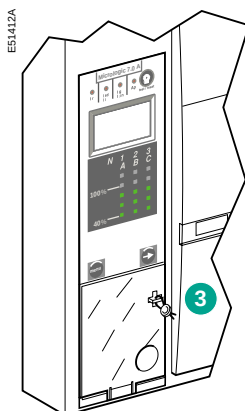
Setting procedure

Setting procedure

1. Open the protective cover.



2. Select the desired setting.
The set value is automatically displayed on the digital screen in absolute value with the relevant units.
c Current in amperes (A and kA);
c Tripping delays in seconds.



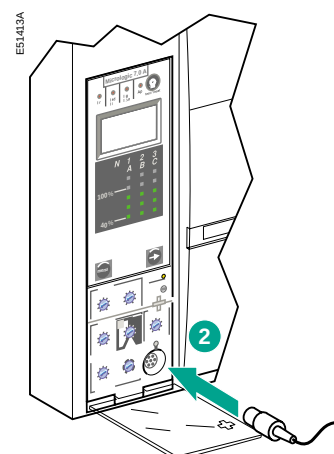
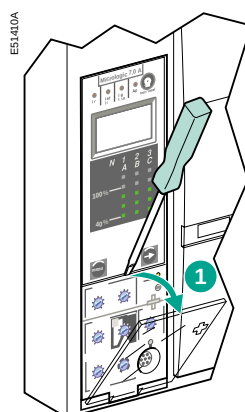
3. If no information is displayed, see the technical appendix "Digital display". If no further action is taken, after a few seconds, the display returns to the main menu for current measurements.

4. Close the protective cover and, if necessary, install a lead seal to protect the settings.

See the user manual for the portable test kit

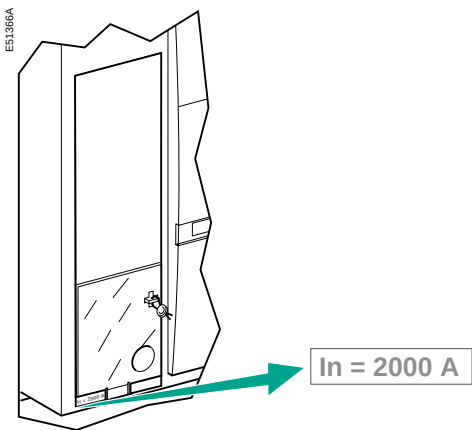
Using the portable test kit

To test the control unit, connect the portable test kit via the test connector.



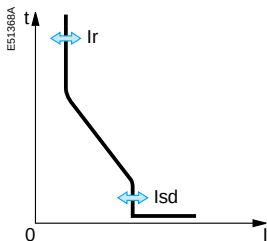
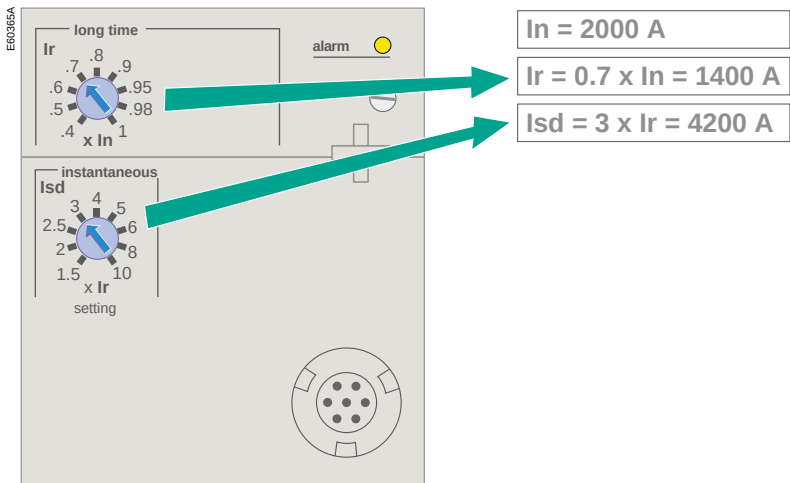
Setting the Micrologic 2.0 A control unit

The rating of the circuit breaker in this example is 2000 A.

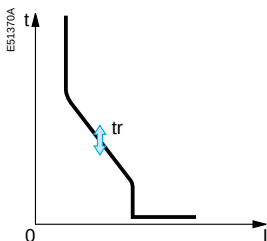
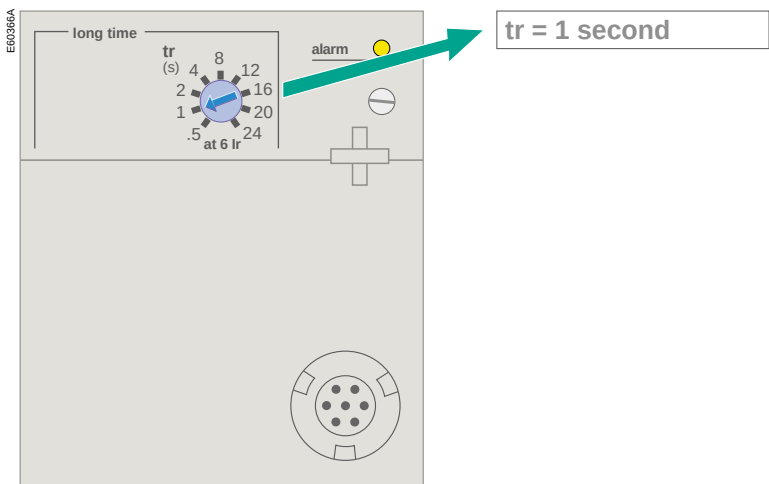


See pages 4 and 5 for information on the available settings

Set the threshold values

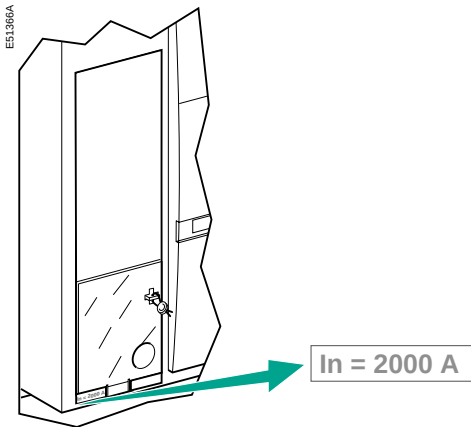


Set the tripping delay

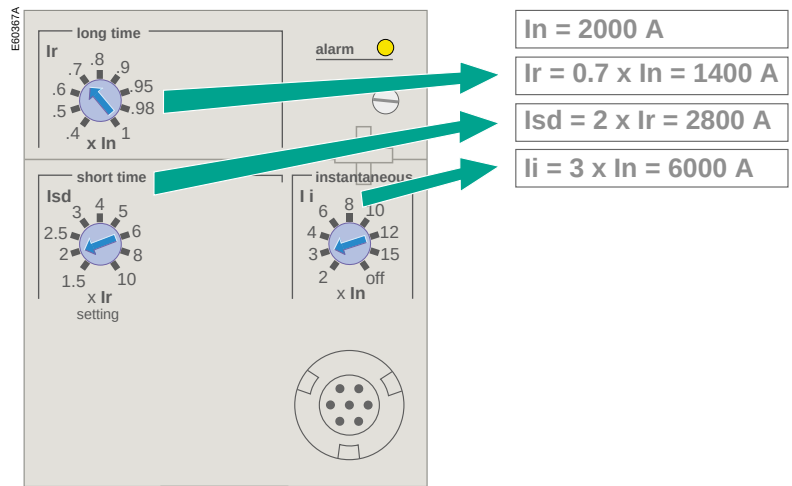


Setting the Micrologic 5.0 A control unit

The rating of the circuit breaker in this example is 2000 A.



Set the threshold values



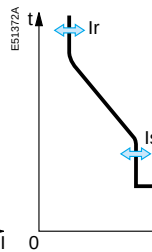
See pages 4 and 5 for information on the available settings

Thresholds

I²t ON curve

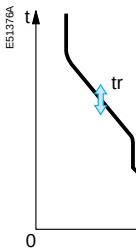


I²t OFF curve

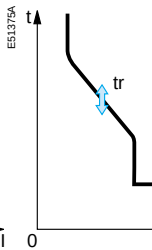


Tripping delays

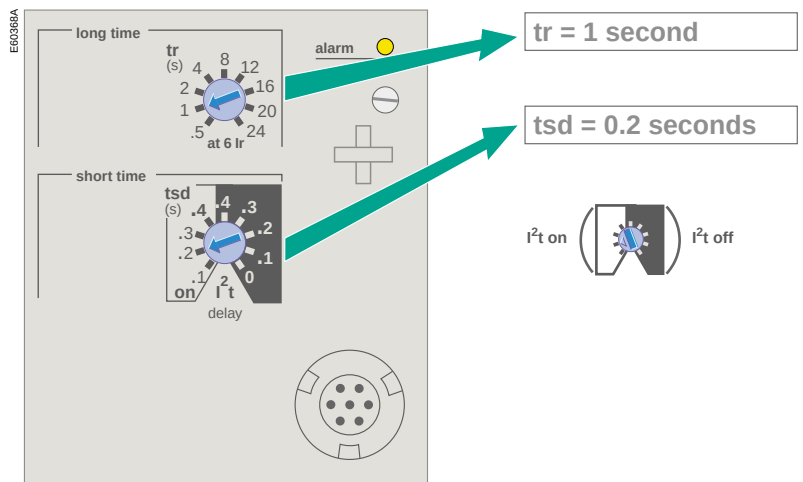
I²t ON curve



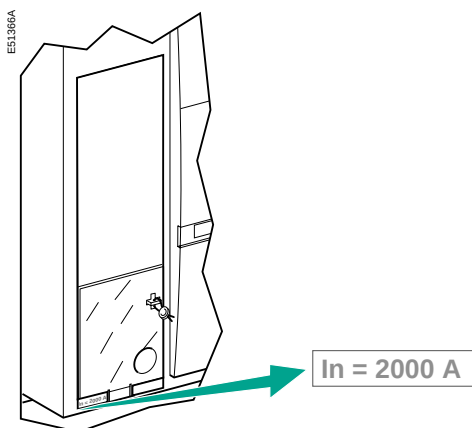
I²t OFF curve



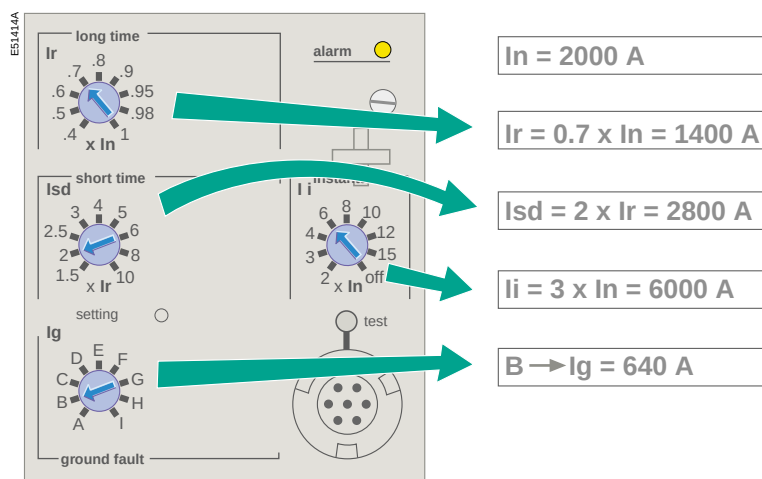
Set the tripping delay



The rating of the circuit breaker in this example is 2000 A.



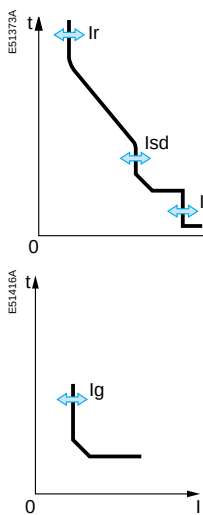
Set the threshold values



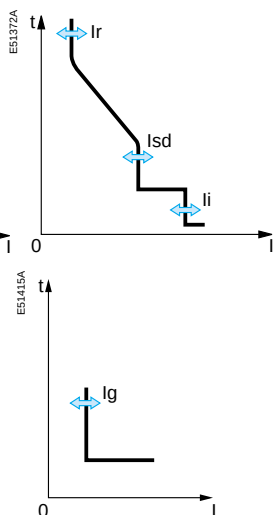
See pages 4 to 6 for information on the available settings.

Thresholds

I²t ON curve

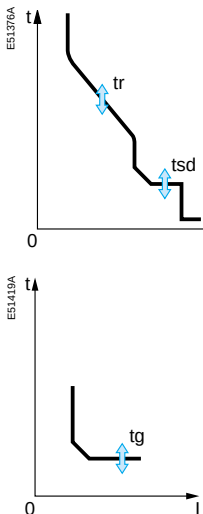


I²t OFF curve

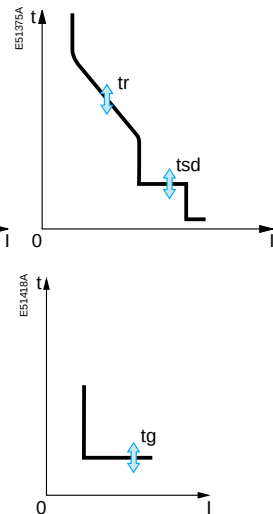


Tripping delays

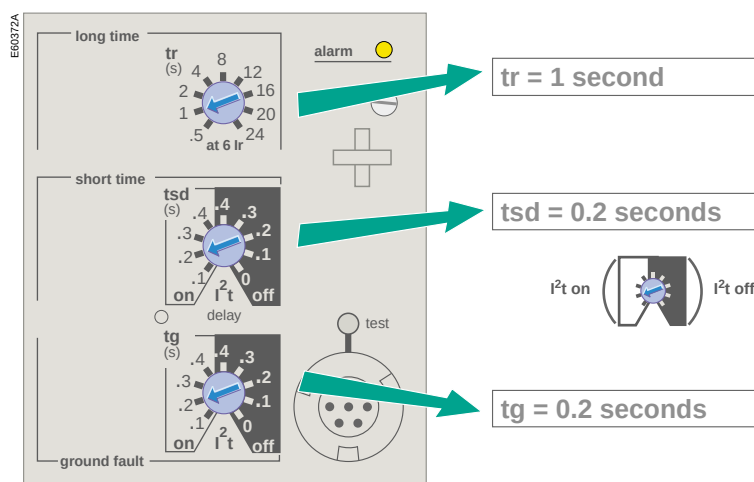
I²t ON curve



I²t OFF curve

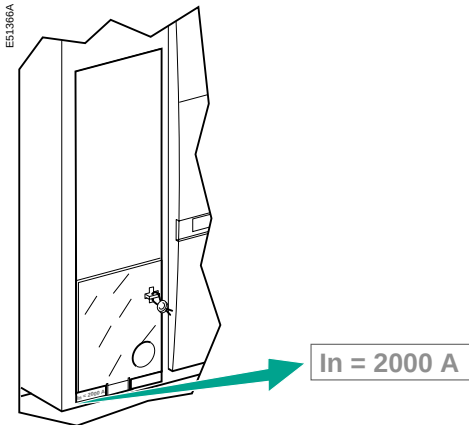


Set the tripping delay

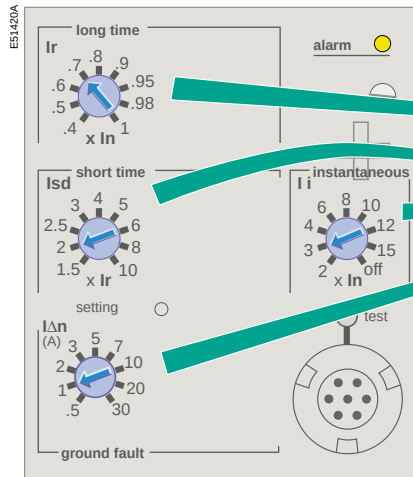


Setting the Micrologic 7.0 A control unit

The rating of the circuit breaker in this example is 2000 A.



Set the threshold values

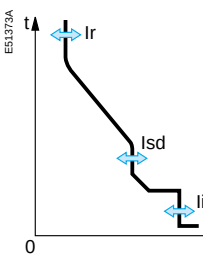


$I_n = 2000 \text{ A}$
$I_r = 0.7 \times I_n = 1400 \text{ A}$
$I_{sd} = 2 \times I_r = 2800 \text{ A}$
$I_i = 3 \times I_n = 6000 \text{ A}$
$I_{\Delta n} = 1 \text{ A}$

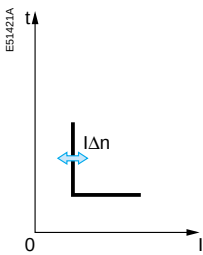
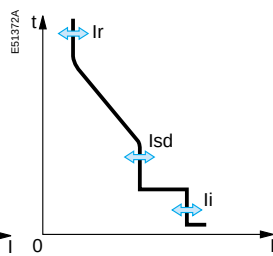
See pages 4 to 7 for information on the available settings.

Thresholds

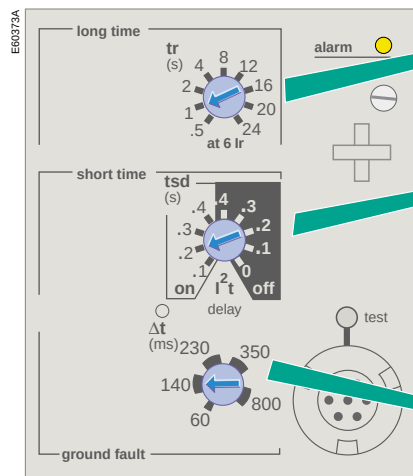
I^2t ON curve



I^2t OFF curve



Set the tripping delay



$t_r = 1 \text{ second}$

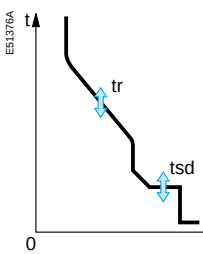
$t_{sd} = 0.2 \text{ seconds}$



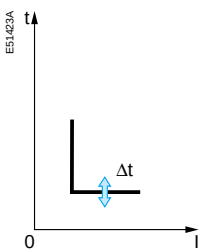
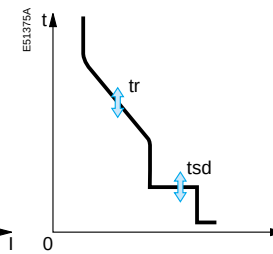
$\Delta t = 140 \text{ milliseconds}$

Tripping delays

I^2t ON curve



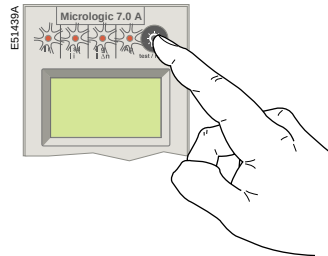
I^2t OFF curve



The procedure for closing the circuit breaker following a fault trip is presented in the circuit-breaker user manual.

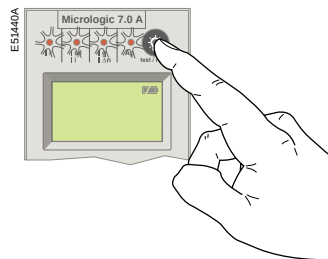
Resetting the fault indications

c determine why the circuit breaker tripped.
The fault indication is maintained until it is reset on the control unit.
v press the fault-trip reset button.



v check the parameter settings of the control unit.

Checking the battery



Press the battery-test button (same as the fault-trip reset button) to display the battery status.

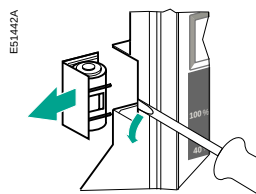
- ES1441A
- ☒ Battery fully charged
 - ☐ Battery half charged
 - ☐ Change the battery

If no information is displayed, either:
c no battery is installed in the control unit, or;
c an auxiliary power supply is required.
See the technical appendix "Digital display".

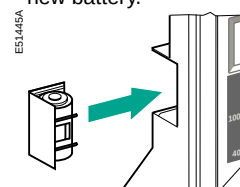
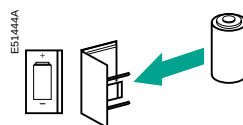
If the battery needs to be changed, please use the one with Schneider catalogue number 33593 (characteristics given on the battery compartment cover).

Changing the control-unit battery

1. Remove the battery cover.
2. Remove the battery.



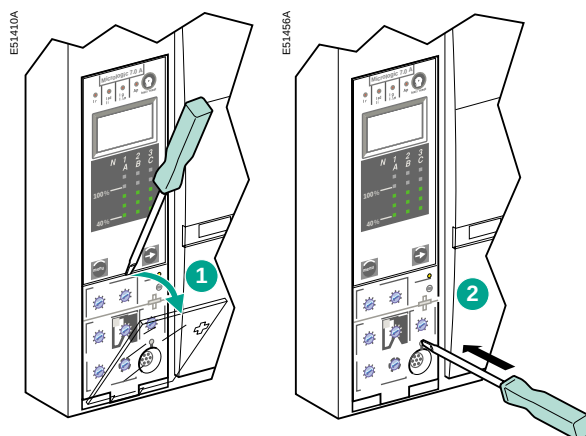
3. Insert a new battery. Check the polarity.
4. Put the cover back in place. Press the battery-test button to check the new battery.



Testing the earth-fault and earth-leakage functions

Charge and close the circuit breaker.

Using a screwdriver, press the test button for earth-fault and earth-leakage protection. The circuit breaker should open.

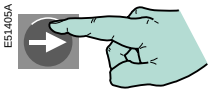


If the circuit breaker does not open, contact the Schneider after-sales support department.

Symbols used:



Briefly press a key.



Press and hold a key.

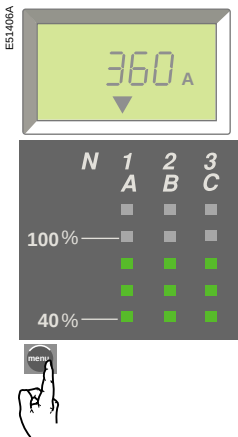
It is possible at any time to stop consulting a current measurement, a maximum current value recorded by the maximeter or the setting values. After a few seconds, the Micrologic control unit automatically returns to the main menu displaying the current value of the most heavily loaded phase.

The protection settings can be displayed directly on the digital display.

Three menus may be accessed on Micrologic control units, providing the following information:

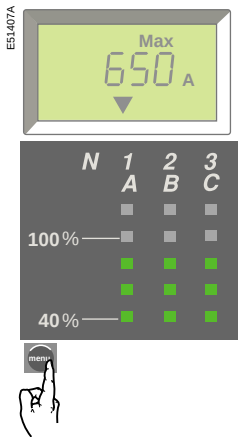
- c phase current measurements I1, I2, I3, neutral IN, earth-fault current Ig on the Micrologic 6.0 A control unit and earth-leakage current IΔn on the Micrologic 7.0 A control unit;
- c maximeter current values for phases I1, I2, I3, neutral IN, the maximum earth-fault current Ig on the Micrologic 6.0 A control unit and the maximum earth-leakage current IΔn on the Micrologic 7.0 A control unit;
- c protection settings and tripping delays.

1. Measurements



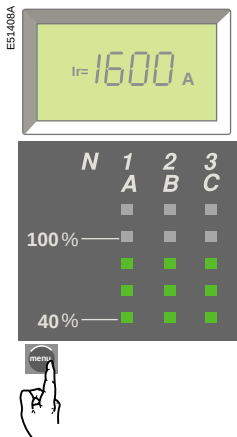
Press the "menu" button to access the maximum current values measured by the **maximeter**.

2. Maximeter



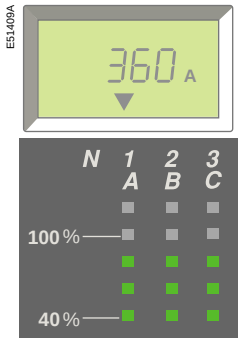
Press the "menu" button to access the protection **settings** and tripping delays.

3. Settings



Press the "menu" button to return to the current **measurements**.

4. The system returns to the main "Measurements" menu.



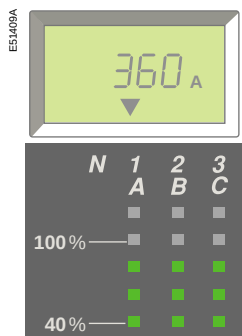
Measuring phase currents

Current values may be read in the "Measurements" menu, which is also the main menu.

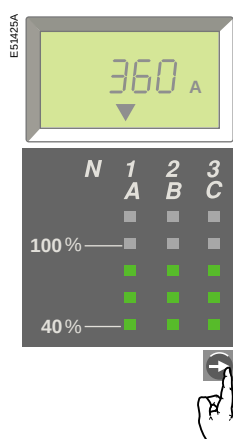
If no particular action is taken, the system displays the current value of the most heavily loaded phase.

"Measurements" menu

Phase 1 is the most heavily loaded.

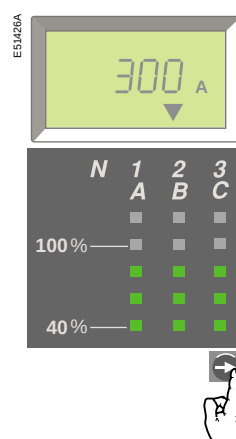


Display of current I1.



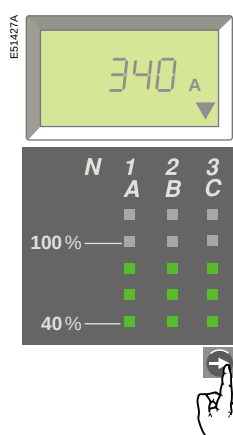
Press the "arrow" button to go on to current I2.

Display of current I2.



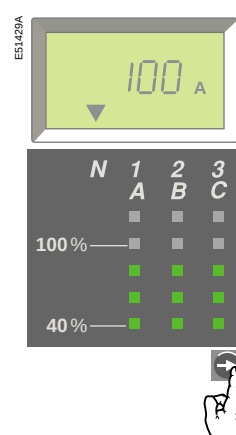
Press the "arrow" button to go on to current I3.

Display of current I3.



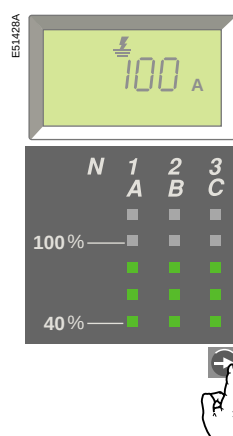
Press the "arrow" button to go on to current IN if the circuit breaker is connected to the neutral.

Display of current IN.



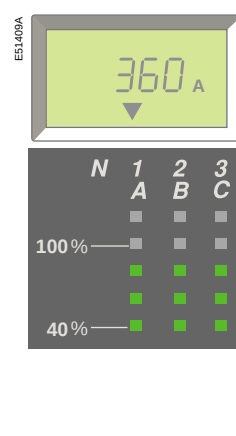
Press the "arrow" button to go on to the earth-fault current Ig or the earth-leakage current IΔn.

Display of current Ig (Micrologic 6.0 A) or current IΔn (Micrologic 7.0 A).



Press the "arrow" button to return to current I1.

The system returns to the display of current I1.

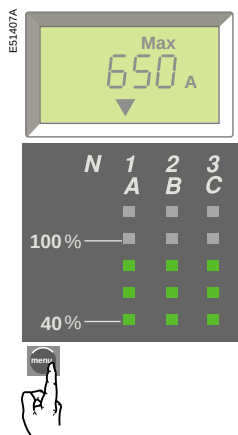


Displaying the maximum current values

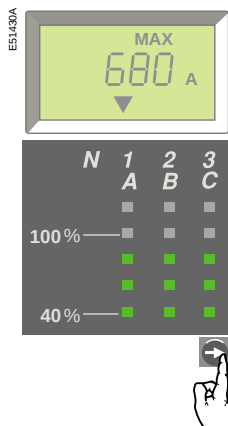
Maximum current values may be read in the "Maximeter" menu.

If no particular action is taken, the system returns to the main menu.

"Maximeter" menu.

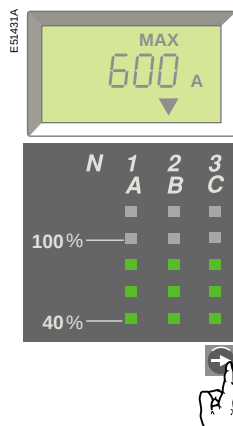


Display of the maximum I1 current.



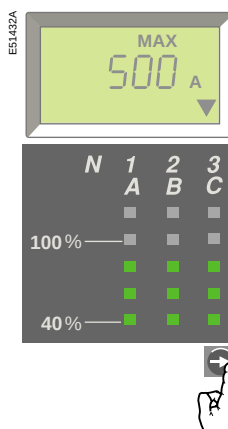
Press the "arrow" button to go on to the maximum I2 current.

Display of the maximum I2 current.



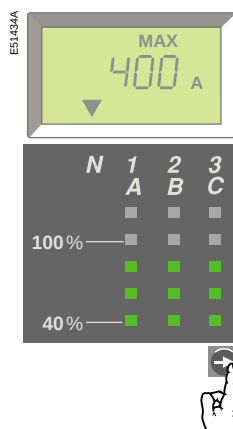
Press the "arrow" button to go on to the maximum I3 current.

Display of the maximum I3 current.



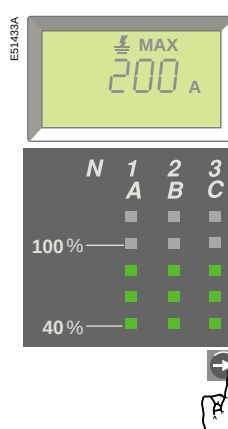
Press the "arrow" button to go on to the maximum IN current if the circuit breaker is connected to the neutral.

Display of the maximum IN current.



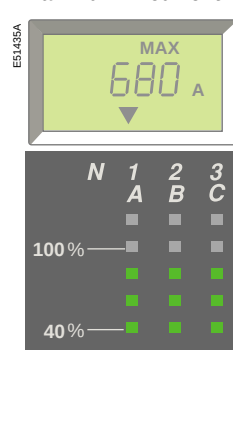
Press the "arrow" button to go on to the maximum earth-fault current Ig (Micrologic 6.0 A) or the maximum earth-leakage current IΔn (Micrologic 7.0 A)

Display of the maximum Ig current or the maximum IΔn current.



Press the "arrow" button to return to the maximum I1 current.

The system returns to the display of the maximum I1 current.

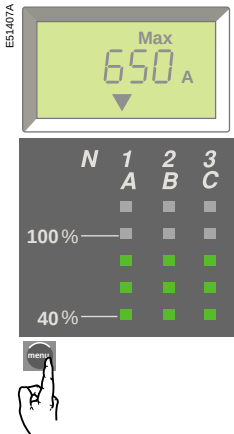


Resetting the maximum current values

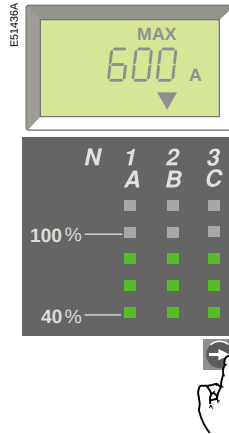
Maximum current values can be reset using the "Maximeter" menu.

If no particular action is taken, the system returns to the main menu.

"Maximeter" menu.

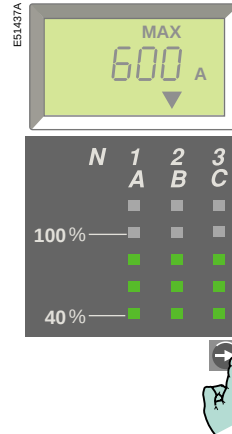


Select the maximum current value to be reset (e.g. I2 max.).



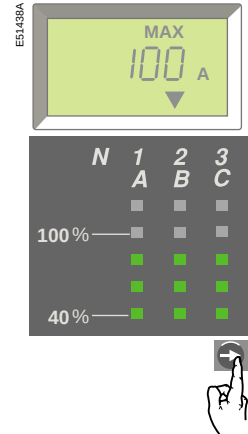
Press the "arrow" button as many times as required to select I2 max.

Reset.

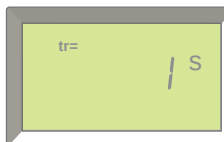
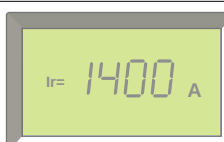


Press and hold the "arrow" button down for three to four seconds. The current value flashes during the reset, then changes to the present value (the new maximum).

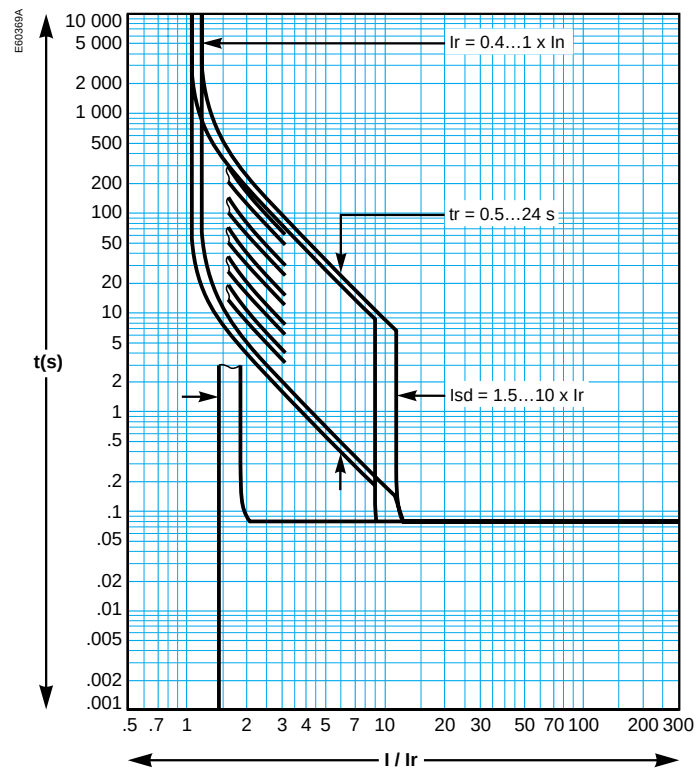
Select another value to reset or return to the main menu.



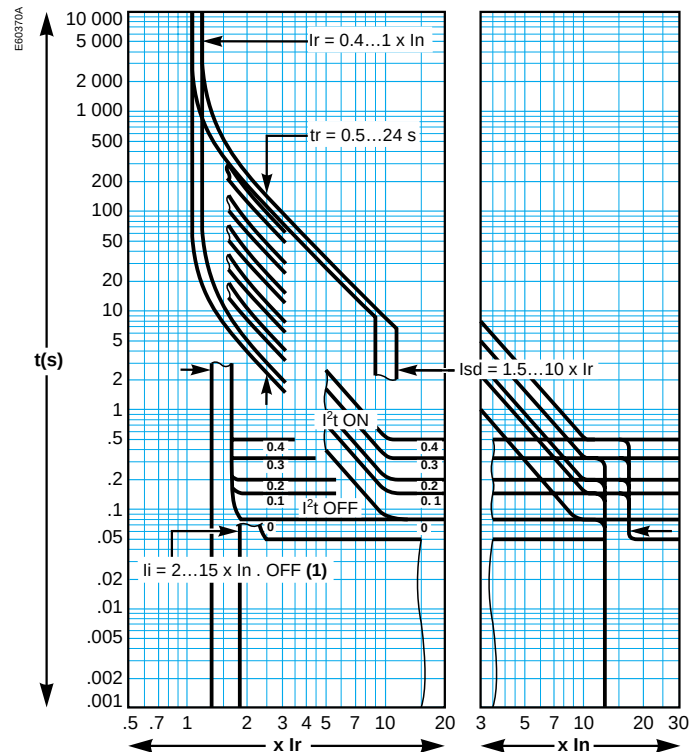
Press the "arrow" button as many times as required to select another maximum value to reset or return to the main menu.

Micrologic control unit					
	2.0A	5.0A	6.0A	7.0A	
E60374A Long-time current setting I_r					 Select the "Settings" menu. The I_r value is the first displayed. 
Long-time tripping delay t_r					 Press the "arrow" button to go on to the t_r value. 
Short-time pick-up I_{sd}					 Press the "arrow" button to go on to the short-time I_{sd} value. 
Short-time tripping delay t_{sd}					 Press the "arrow" button to go on to the t_{sd} value. 
Instantaneous pick-up I_{sd}					 Press the "arrow" button to go on to the instantaneous I_{sd} value. Or 
Instantaneous pick-up I_i					 the instantaneous I_i value. 
Earth-fault pick-up I_g					 Press the "arrow" button to go on to the I_g value. Or 
Earth-leakage pick-up $I_{\Delta n}$					 the $I_{\Delta n}$ value. 
Earth-fault tripping delay t_g					 Press the "arrow" button to go on to the t_g value. Or 
Earth-leakage tripping delay Δt					 the Δt value. 
					 Press the "arrow" button to return to the beginning of the menu. 

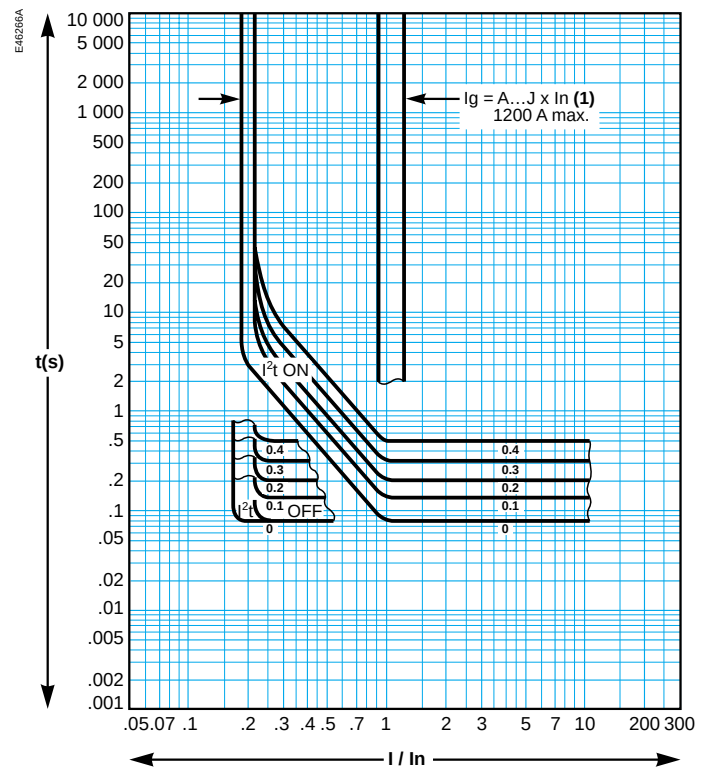
Long-time and instantaneous protection (Micrologic 2.0 A)



Long-time, short-time and instantaneous protection (Micrologic 5.0 A, 6.0 A and 7.0 A)



Earth-fault protection (Micrologic 6.0 A)



Changing the long-time rating plug

Select the long-time rating plug

A number of setting ranges for the long-time current setting are available on Micrologic A control units by changing the long-time rating plug.

The available rating plugs are listed below.

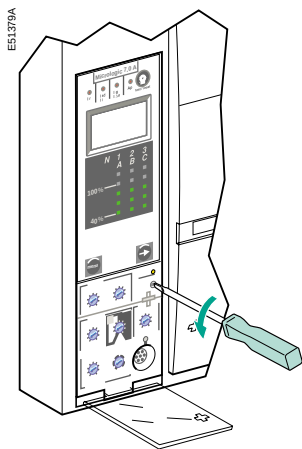
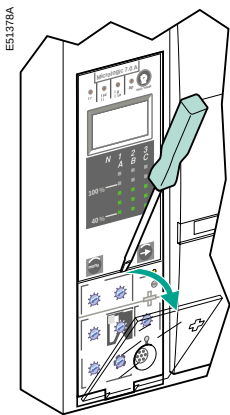
Part number	Setting range for the I_r value	
33542	standard	0.4 to 1 x I_r
33543	low setting	0.4 to 0.8 x I_r
33544	high setting	0.8 to 1 x I_r
33545	without long-time protection	

Caution.
Following any modifications to the long-time rating plug, all control-unit protection parameters must be checked.

Change the long-time rating plug

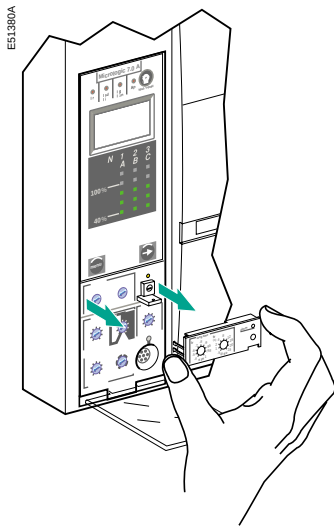
Proceed in the following manner.

1. Open the circuit breaker.
2. Open the protective cover of the control unit.
3. Completely remove the long-time rating plug screw.

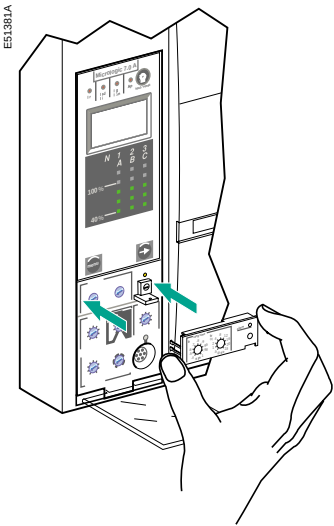


Caution.
If no long-time rating plug is installed, the control unit continues to operate under the following downgraded conditions:
c the long-time current setting I_r is 0.4;
c the long-time tripping delay t_r corresponds to the value indicated by the adjustment dial;
c the earth-leakage protection function is disabled.

4. Snap out the rating plug.

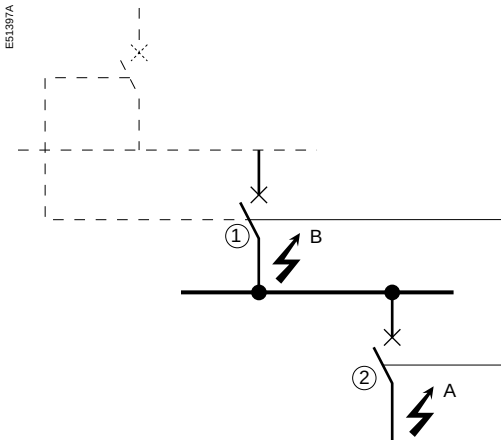


5. Clip in the new rating plug.



6. Refit the screw for the long-time rating plug.
7. Check and/or modify the control-unit settings.

Zone selective interlocking (ZSI)



Operating principle

c A fault occurs at point A.

Downstream device no. 2 clears the fault and sends a signal to upstream device no. 1, which maintains the short-time tripping delay t_{sd} or the earth-fault tripping delay t_g to which it is set.

c A fault occurs at point B.

Upstream device no. 1 detects the fault. In the absence of a signal from a downstream device, the upstream device immediately trips without taking into account its tripping-delay settings. If it is connected to a device even further upstream, it sends a signal to that device, which delays tripping according to its t_{sd} or t_g setting.

Note :

On a circuit breaker likely to receive a ZSI signal, the t_{sd} and t_g tripping delays must not be set to zero, as this would make discrimination impossible.

Connections between control units

A logic signal (0 or 5 volts) can be used for zone selective interlocking between the upstream and downstream circuit breakers.

c Micrologic 5.0 A, 6.0 A, 7.0 A.

c Micrologic 5.0 P, 6.0 P, 7.0 P.

c Micrologic 5.0 H, 6.0 H, 7.0 H.

Wiring

c maximum impedance: $2.7 \Omega / 300$ metres

c capacity of connectors: 0.4 to 2.5 mm^2

c maximum cross-sectional area of wires (including insulation): 3.5 mm^2

c wires: single or multicore

c maximum length: 3000 metres

c limits to device interconnection:

v the common ZSI - OUT - SOURCE (Z1) and the output ZSI - OUT (Z2)

can be connected to a maximum of 10 inputs;

v a maximum of 100 devices may be connected to an input ZSI IN CR (Z4) or GF (Z5)

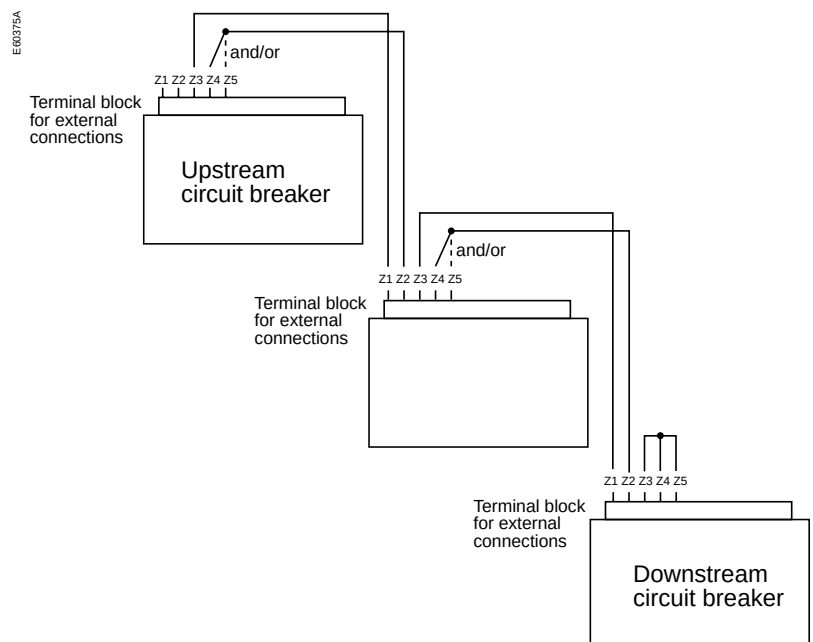
c connections are made from the output ZSI - OUT (Z2) on the downstream device to the input(s) ZSI - IN - ST (Z4) and/or GF (Z5) on the upstream device.

Caution.

If the protection function is not used on circuit breakers equipped for ZSI protection, a jumper must be installed to short terminals Z3, Z4 and Z5.

If the jumper is not installed, the short-time and earth-fault tripping delays are set to zero, whatever the position of the adjustment dial.

Terminals Z1 to Z5 correspond to the identical indications on the circuit-breaker terminal blocks.



For information on connecting an external power supply, see the electrical diagrams in the circuit-breaker user manual.

- c display of measurements operates without an external power supply.
- The digital display goes off if the current drops below $0.2 \times I_n$ (I_n = rated current).
- c display back-lighting is disabled in the following situations:
 - v current less than $1 \times I_n$ on one phase;
 - v current less than $0.4 \times I_n$ on two phases;
 - v current less than $0.2 \times I_n$ on three phases.
- c the maximeter does not operate for currents under $0.2 \times I_n$.

These three functions may be maintained by adding an external power supply. Even if an external power supply is installed, the long-time, short-time, instantaneous and earth protection functions will not use it.

Thermal memory

Thermal memory

The thermal memory is a means to simulate temperature rise and cooling caused by changes in the flow of current in the conductors.

These changes may be caused by:

- c repetitive motor starting;
- c loads fluctuating near the protection settings;
- c repeated circuit-breaker closing on a fault.

Control units without a thermal memory (contrary to bimetal strip thermal protection) do not react to the above types of overloads because they do not last long enough to cause tripping. However, each overload produces a temperature rise and the cumulative effect can lead to dangerous overheating.

Control units with a thermal memory record the temperature rise caused by each overload. Even very short overloads produce a temperature rise that is stored in the memory.

This information stored in the thermal memory reduces the tripping time.

Micrologic control units and thermal memory

All Micrologic control units are equipped as standard with a thermal memory c for all protection functions, prior to tripping, the temperature-rise and cooling time constants are equal and depend on the tripping delay in question:

- v if the tripping delay is short, the time constant is low;
- v if the tripping delay is long, the time constant is high.

c for long-time protection, following tripping, the cooling curve is simulated by the control unit. Closing of the circuit breaker prior to the end of the time constant (approximately 15 minutes) reduces the tripping time indicated in the tripping curves.

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